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REMARKS

Claims 1-49, of which claims 1, 16, and 31 are independent, are pending in the present patent application. In the Office Action mailed October 14, 2003, the Examiner (i) restricted the claims of the application to one of two groups (claims 1-30 or claims 31-46); (ii) rejected claims 1-30 under 35 U.S.C. § 103(a); and (iii) rejected claims 1, 3, 16, and 18 under the judicially created doctrine of obviousness-type double patenting.

As set forth, Applicants have withdrawn claims 31-46, amended claims 1, 14 and 16, canceled claim 13, and added claims 47-49. No new matter has been added. Furthermore, after careful review of the cited references, Applicants respectively request reconsideration in view of the following remarks.

I. Election Requirement

Applicants elect to prosecute the invention of Group I., claims 1-30, with traverse. Claims 31-46 have been withdrawn as being drawn to a non-elected invention. The Examiner is reminded that “[i]f the search and examination of [the] entire application can be made without serious burden, the examiner must examine it on the merits, even though it includes claims to independent or distinct inventions.” (MPEP § 803).

II. 35 U.S.C. § 103(a) Claim Rejections

Claims 1-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable under combinations of the references contained within the following section headings. Applicants respectfully traverse. To establish a *prima facie* case of obviousness, there must be some suggestion or motivation to combine or modify the cited references, and the cited references must teach or suggest all the claim limitations. (MPEP § 2142). Further, a reference must be considered in its entirety including portions that would lead away from the claimed invention.

(MPEP § 2141.02). Thus, teachings in cited references that conflict with the present invention can invalidate an asserted obviousness rejection.

A. Lin and Williams References

Claims 1, 3, 6-9, 13-16, 18, 24-28 and 30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin et al., U.S. Patent Application Publication No. 2001/0021570 A1, (Lin) in view of Williams, U.S. Patent No. 4,930,001 (Williams).

Claim 1 was amended to include limitations from originally presented claim 13. As such, claim 1 now includes “depositing a first layer of mating material on a first mating surface,” and “depositing a second layer of mating material on a second mating surface.” The Examiner states that Lin teaches “depositing a first and second layer of mating material such as chromium (Cr) before depositing the first and the second material layer (see the figure 14b),” as in original claim 13. (Office Action, p. 5). Applicants disagree. Lin illustrates a CR *or* an Au (gold) layer of material on a Pyrex Glass Cap in figure 14b. Lin does not teach or suggest “depositing a first layer of mating material on a first mating surface,” and then “depositing a first layer of material on the first mating surface, wherein the first layer of material is selected from the group consisting of gold and tin,” as in pending claim 1.

Further, Lin simply fails to teach “depositing a second layer of mating material on a second mating surface,” and “depositing a second layer of material on the second mating surface, wherein the second layer of material is selected from the group consisting of indium and lead,” as in claim 1. Lin teaches that a thermal oxide layer is grown on top of the substrate before the indium solder layer is deposited. (Lin, ¶0072). However, this oxide layer is only grown on one surface, and further the oxide layer is *grown* on the surface. In contrast, pending claim 1 recites “depositing” layers of mating material on a “first” and a “second” mating surface. (Claim 1).

Similar to Lin, Williams teaches forming a silicon pad on a substrate and then depositing layers of material. (Williams, Col. 2, lines 22-25). In contrast, pending claim 1 recites “depositing” layers of mating material on the mating surface, followed by depositing layers of diffusion materials. Further, Williams simply fails to teach “depositing a first layer of mating material on a first mating surface,” and then “depositing a first layer of material on the first mating surface, wherein the first layer of material is selected from the group consisting of gold and tin,” and “depositing a second layer of mating material on a second mating surface,” and “depositing a second layer of material on the second mating surface, wherein the second layer of material is selected from the group consisting of indium and lead,” as in pending claim 1. Williams is directed toward “the alloy bonding of indium bumps to gold pads,” which lacks the steps of depositing layers of mating materials. (Williams, Col. 1, lines 7-10).

In addition, both Lin and Williams fail to teach all of the limitations of pending independent claim 16. For example, both Lin and Williams fail to teach “depositing a layer of indium on a second mating surface such that the layer of gold is in excess of the layer of indium.” (Claim 16). Lin simply fails to teach any thicknesses of any gold or indium layers present in the microstructure assembly presented. And as indicated by the Examiner, Williams discloses that within a pad structure presented, indium bumps have a thickness in the range of 1-9 microns (e.g., 10,000-90,000 Angstroms) and a layer of gold has a thickness in the range of 1000-5000 Angstroms. (Williams, Col. 2, lines 48-53). Thus, Williams teaches that the layer of indium is applied in excess of the layer of gold, and thus teaches the opposite of claim 16. Accordingly, a reference lacking teaching of thicknesses of claimed materials combined with a reference teaching thicknesses in different proportions than that of pending claim 16 would not

suggest the limitations in pending claim 16 in light of the disclosures in the cited references that teach away from the present invention, i.e., that indium is applied in excess of gold.

Accordingly, since neither Lin nor Williams, separately or in combination, teach or suggest all the claimed limitations of pending independent claims 1 and 16, and since Williams teaches away from the present invention, the asserted obviousness rejection of claims 1, 3, 6-9, 13-16, 18, 24-28 and 30 should be withdrawn.

B. Lin, Williams and Waelti References

Claims 2 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin in view of Williams and further in view of Waelti, European Patent No. 000981159 (Waelti).

Applicants contend that Waelti does not make up for the shortcomings of Lin and Williams. For example, Waelti teaches a solid-liquid inter diffusion process to form a bond whose melting point is above the process temperature but below the melting point of the high melting component. (Waelti, Abstract). However, Waelti fails to teach all of the limitations of claims 1 and 16. For instance, Waelti at least does not teach depositing layers of mating material as in claim 1, and Waelti does not teach thicknesses of any gold or indium layers present in the microbond presented, as in claim 16. Thus, since claim 2 depends from claim 1 and claim 17 depends from claim 16, Waelti fails to teach all the claim limitations of claims 2 and 17.

As a result, the combination of Lin, Williams, and Waelti fails to teach or suggest all the claimed limitations of claims 1 and 16 and, therefore does not render claims 2 and 17 obvious.

C. Lin, Williams and Stacher References

Claims 4-5, 10-12, and 19-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin in view of Williams and further in view of Stacher, U.S. Patent No. 5,118,026 (Stacher).

Similar to above, Stacher does not make up for the shortcomings of both Lin and Williams. For example, Stacher does not teach all of the claim limitations in pending claim 1 (e.g., depositing layers of mating material) or in pending claim 16 (e.g., thicknesses of gold and indium layers). Further, Stacher does not teach any of the claim limitations of dependent claims 4-5, 10-12, or 19-23. The Examiner asserts that since Stacher teaches that actual times, pressure and temperature for a bonding process will vary from metal to metal in order to form stronger bonds, this teaching alone would enable one skilled in the art to optimize these effective variables to form stronger bonds. (Office Action, p. 7). Applicants disagree. The general statements made in Stacher do not teach or suggest the specific pressures, temperatures, and time claim limitations contained in claims 4-5, 10-12, and 19-23. To render these claims obvious, the cited reference must teach the claim limitations. Since Stacher does not teach or suggest the specific limitations claimed, then Stacher fails to render claims 4-5, 10-12, and 19-23 obvious.

Furthermore, Stacher does not even mention the types of materials (e.g., gold and indium) as recited in independent claims 1 and 16. For example, Stacher makes no mention of gold or indium in any bonds formed within its titanium sandwich. Thus, Stacher cannot teach or suggest any specific bonding times, temperatures, or pressures for a gold-indium bond.

Still further, Stacher is directed toward bonding within large-scale structures. In contrast, the present invention is directed toward bonding within a micro-structure, such as a MEMS. One concerned with bonding in microstructures as taught in Lin and Williams would not look to Stacher simply because a method of solid state diffusion bonding is presented. Thus, being directed toward entirely different needs, neither Lin and Williams, nor Stacher provide any suggestion or motivation to make the asserted combination to arrive at the present invention.

Accordingly, since none of the cited references, separately or in combination, teach or suggest all the claimed limitations of the pending claims, and since none of the cited references provide any motivation to make the asserted combination to arrive at the claimed invention, then the asserted obviousness rejection based on the cited combination of Lin, Williams, and Stacher should be withdrawn.

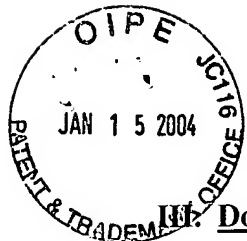
D. Lin, Williams and Eberle References

Claims 14 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin in view of Williams and further in view of Eberle et al., U.S. Patent No. 6,049,958 (Eberle).

Similar to above, Eberle at least does not teach depositing layers of mating material as in pending claim 1, and Eberle does not teach thicknesses of any gold or indium layers present in the flex circuit presented, as in pending claim 16.

The Examiner indicates that Eberle teaches depositing a thin layer of chromium followed by the deposition of a gold layer of material. (Office Action, p. 7). However, the chromium and gold layers are then etched to form transducer signal lines of a flex circuit. (Eberle, Col. 11, lines 22-27). No bonds are formed using these layers in Eberle. In contrast, pending claims 1 and 16 are both directed toward a method of forming a bond using gold and indium materials. Further, pending claim 1 includes “depositing a second layer of mating material on a second mating surface,” and “depositing a second layer of material on the second mating surface, wherein the second layer of material is selected from the group consisting of indium and lead,” of which Eberle lacks any teaching or suggestion.

As a result, the combination of Lin, Williams, and Eberle fails to teach or suggest all the claimed limitations of claims 1 and 16 and, therefore does not render claims 14 and 29 obvious.



III. Double Patenting Rejection

Claims 1, 3, 16, and 18 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,234,378 (Ford). Applicants recognize that a timely filed terminal disclaimer in compliance with 37 C.F.R. 1.321(c) may be used to overcome this rejection provided that the conflicting patent is shown to be commonly owned with the present application. Applicants decline to submit a terminal disclaimer at this time; however, Applicants may file a terminal disclaimer upon receiving notification of allowance of the pending claims.

Applicants contend that pending claims 1, 3, 16 and 18 are patentably distinct from claim 1 of Ford. Pending claim 1 includes depositing layers of mating material, and pending claim 16 includes depositing a layer of indium on a second mating surface such that the layer of gold is in excess of the layer of indium. Each of these limitations is not present in claim 1 of Ford.

IV. Summary

Applicant respectfully submits that, in view of the remarks above, the present application, including claims 1-30 and 47-49, is now in condition for allowance and solicits action to that end.

If there are any additional matters that may be resolved through a telephone interview, the Examiner is requested to contact Applicants' undersigned representative at (312)-913-0001.

Respectfully submitted,

McDonnell Boehnen Hulbert & Berghoff

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